III.6 GROUNDWATER, WATER SUPPLY, AND WATER QUALITY

This chapter describes the affected environment of the Desert Renewable Energy Conservation Plan (DRECP) area or within the Bureau of Land Management (BLM) Land Use Plan Amendment (LUPA) Decision Area for groundwater, water supply, and hydrologic conditions and processes. It also describes applicable federal, state, and local laws and regulations for the use and management of water resources in the LUPA Decision Area.

III.6.1 Regulatory Setting

III.6.1.1 Federal

III.6.1.1.1 Clean Water Act

The federal Clean Water Act (CWA 33 United States Code [U.S.C.] 1251 et seq.) requires that states set standards to protect water quality, including the regulation of stormwater and wastewater discharges during facility construction and operation (Section 402). The CWA also establishes regulations and standards to protect wetlands and navigable waters (Section 404). The U.S. Army Corps of Engineers issues Section 404 permits for discharges of dredge or fill material. These permits cover discharges to waters of the United States, and are subject to Section 401 water quality federal license and permit certification. Section 401 certification is required if U.S. surface waters, including perennial and ephemeral drainages, streams, washes, ponds, pools, and wetlands, could be adversely impacted. The U.S. Army Corps of Engineers and a Regional Water Quality Control Board (RWQCB) can require that impacts to these waters be quantified and mitigated. Whenever a discharge is made to U.S. waters the RWQCB issues National Pollution Discharge Elimination System (NPDES) and Waste Discharge Requirement (WDR) permits. If a discharge is confined to state waters, such as to groundwater, only a WDR permit is required.

III.6.1.1.2 Resource Conservation Recovery Act

The Resource Conservation and Recovery Act (RCRA) (42 U.S.C. 6901 et seq.; 40 Code of Federal Regulation [CFR] Part 260 et seq.) grants the Environmental Protection Agency (EPA) the authority to control the generation, transportation, treatment, storage, and disposal of hazardous waste. The RCRA also provides the framework for managing nonhazardous solid wastes and is administered jointly in California by the Department of Toxic Substances Control and RWQCBs.

III.6.1.1.3 Reclamation Reform Act

Under the Reclamation Reform Act of 1982 (Public Law 97–2933; 96 Stat. 1261), the U.S. Bureau of Reclamation (USBR) manages, develops, and protects U.S. waters and related resources.

III.6.1.1.4 Safe Drinking Water Act

The Safe Drinking Water Act (42 U.S.C. 300[f] et seq.) establishes requirements and provisions for the Underground Injection Control Program. One way this law safeguards the public health is by protecting underground drinking water sources from injection well contamination. General provisions for the Underground Injection Control Program (including state primacy for the program) are described in Sections 1421 through 1426. The California Division of Oil, Gas, and Geothermal Resources has the authority to issue federal Class V Underground Injection Control permits for geothermal fluid injections.

III.6.1.1.5 Environmental Protection Agency Sole Source Aquifer Protection Program

The EPA Sole Source Aquifer Protection Program, established in Section 14245(e) of the Safe Drinking Water Act, requires that EPA review proposed federally assisted projects to determine their potential for aquifer contamination.

III.6.1.1.6 Colorado River Water Accounting Surface

Colorado River diversions are governed by the Colorado River Compact, signed in 1922, and by associated documents subsequently affirmed by the United States Supreme Court in Arizona v. California (547 U.S. 150 2006) (Consolidated Decree). For decades, California consumed the river's yield surplus because other western states did not use all of their allotments. Water demand grew outside California, and in 2001 the U.S. Department of the Interior (DOI) issued Interim Surplus Guidelines that define Lake Mead reservoir elevations at which California would not be able to use surplus water, limiting California to its normal apportionment of 4.4 million acre-feet/year. Several contracts for the delivery of water executed by the Secretary of the Interior in the 1930s specified the apportionment of the water of the Colorado River available for use within California to a number of respective interests including: first priority to Palo Verde Irrigation District for beneficial use upon a gross area of 104,500 acres, second priority to the Yuma Project (Reservation Division) for beneficial use, third priority to (a) the Imperial Irrigation District and Coachella Valley Water District, and (b) Palo Verde Irrigation District for use exclusively on 16,000 acres of the Lower Palo Verde Mesa for beneficial consumptive use. These contracts specified that total beneficial consumptive use under these priorities shall not exceed 3.85 million acre-feet/year (of California's 4.4 million acre-feet/year total yield[87.5%]). In 2003, the

Secretary of the Interior executed the Colorado River Water Delivery Agreement. That agreement provides that, except as otherwise determined under the Department of the Interior's Inadvertent Overrun and Payback Policy, the Secretary shall deliver Priority 3(a) Colorado River water to:

- Imperial Irrigation District in an amount up to but not more than a consumptive use amount of 3.1 million acre-feet/year less the amount of water equal to that to be delivered for the benefit of Coachella Valley Water District, the Metropolitan Water District of Southern California, San Diego County Water Authority, the San Luis Rey Indian Water Rights Settlement Parties, and Indian and miscellaneous present perfected rights as set forth in the exhibits to the agreement.
- Coachella Valley Water district in an amount up to but not more than a consumptive use amount of 330,000 acre-feet/year less the amount of water equal to that to be delivered for the benefit of Imperial Irrigation District, the Metropolitan Water District of Southern California, San Diego County Water Authority, the San Luis Rey Indian Water Rights Settlement Parties, and Indian and miscellaneous present perfected rights as set forth in the exhibits to the agreement.

The USBR monitors and accounts for all water use in areas with diversions from the Lower Colorado River. In the 1990s, the United States Geological Survey (USGS), in cooperation with USBR, developed an accounting-surface method to identify wells outside the floodplain of the Lower Colorado River that "will yield water that will be replaced by water from the river" (Wilson and Owen-Joyce 1994, Owen-Joyce et al. 2000, Wiele et al. 2008). The river aquifer consists of permeable, partly saturated sediments and sedimentary rocks that are hydraulically connected to the Colorado River so that water can move between the river and the aquifer. In 2008, USGS updated the accounting surface using a physically based groundwater flow model (Wiele et al. 2008). While USBR has withdrawn a proposed rule incorporating the accounting surface, it is considered to be the best available science on this issue. Significantly, water pumped from a well having a static water level above the accounting surface would be deemed tributary water, and a Colorado River entitlement would not be needed.

III.6.1.1.7 Wild and Scenic Rivers Act

The 1968 National Wild & Scenic River Act (Public Law 90–542; 16 U.S.C. 1271 et seq.) protects the environmental values of free-flowing streams from degrading activities, including those from water resource projects. It establishes this policy for certain U.S. rivers that, together with their immediate environments, possess outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. These rivers are to be preserved in their free-flowing conditions for the benefit and enjoyment of present and future generations (16 U.S.C. 1271).

The National Wild and Scenic River System is administered jointly by the U.S. Forest Service (USFS), the U.S. Department of Agriculture (USDA), the National Parks Service (NPS), and DOI. All development plans affecting water use and related land resources must consider potential impacts to national wild, scenic, and recreational river areas. River basin and project plan reports submitted to the United States Congress shall also consider these potential impacts (16 U.S.C. 1276[d]).

III.6.1.1.8 Bureau of Land Management (BLM) Bishop Field Office Resource Management Plan

The BLM administers a large portion of the public lands in the DRECP area (44% of the total). The BLM lands are managed according to the California Desert Conservation Area (CDCA) Plan, originally adopted in 1980. Localized BLM Resource Management Plans (RMPs) further define regulations and policies for CDCA land use. Examples related to groundwater include the following standard operating procedures and policies in BLM's Bishop Field Office RMP:

- Existing water quality and beneficial uses shall be inventoried prior to authorizing any project with potential to impact water quality. Best management practices and appropriate mitigation will be identified during project level environmental review and applied during project implementation to ensure compliance with the federal anti-degradation policy.
- Activities involving discharge of dredged or fill materials into Waters of the United States or their adjacent wetlands will be reviewed for compliance with Section 404 of the CWA.
- Groundwater pumping is prohibited where it interferes with valid existing water uses, desired plant community goals, or other resource condition objectives.

III.6.1.2 State

III.6.1.2.1 California Constitution, Article X, Section 2

The California State Constitution, Article X, Section 2, states that water resources of the state be put to beneficial use to the fullest extent possible and prohibits water waste, unreasonable use, or unreasonable methods of use.

III.6.1.2.2 Porter–Cologne Water Quality Control Act

California's Porter–Cologne Water Quality Control Act, enacted in 1969 (Cal. Stats. 1969, Ch. 482), provides the legal basis for water quality regulation in California. It predates the CWA and regulates discharges to state waters. This law requires a Report of

Waste Discharge for any discharge of waste (liquid, solid, or gaseous) to land or surface waters that may impair beneficial uses for surface or groundwater of the state. Waters of the state are more than just waters of the United States and include, for example, groundwater and some surface waters that do not meet the definition for waters of the United States. In addition, it prohibits waste discharges or the creation of water-related "nuisances," which are more broadly defined than the CWA definition of "pollutant." Discharges under the Porter–Cologne Act are permitted with waste discharge requirements and may be required even when the discharge is already permitted or exempt under the CWA.

III.6.1.2.3 California Water Code

The California Water Code stipulates that the primary interest of the people of the State of California is the conservation of all available water resources, and requires that the maximum re-use of reclaimed water offset potable resource use (Sections 451 and 13550 et seq.). The code divides California water rights into three categories: surface water, percolating groundwater, and subterranean streams that flow through known and definite channels (Section 1200). The code defines waters of the state (Section 13050) and requires regional basin plans. These plans define water quality objectives that protect the beneficial uses of surface water and groundwater and provide comprehensive water quality planning (Sections 13240 through 13243). The code further includes many other provisions that (1) define reasonable and beneficial water uses; (2) set standards for well drilling; (3) require that water supplies for large new developments be demonstrated in advance; (4) require Storm Water Pollution Prevention plans; and (5) address other aspects of water resources, water rights, and water management.

III.6.1.2.4 Water Quality, Supply and Infrastructure Improvement Act and Sustainable Groundwater Management Act

In 2014 the Water Quality, Supply and Infrastructure Improvement Act and the Sustainable Groundwater Management Act were signed into law. The Water Quality, Supply and Infrastructure Improvement Act includes funding for integrated regional water management, water recycling, groundwater sustainability, and watershed protection and ecosystem restoration. The Sustainable Groundwater Management Act provides for sustainable management of groundwater basins, establishes minimum standards for effective and continuous management of groundwater, avoids or minimizes impacts of land subsidence, increases groundwater storage and removes impediments to recharge, and improves data collection and understanding of groundwater resources and management. Sustainable groundwater management is defined as the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results. The act requires local agencies to establish groundwater sustainability agencies and develop groundwater sustainability plans for groundwater basins or sub-basins that are designated as medium or high priority basins.

III.6.1.2.5 State Water Resources Control Board and Regional Water Quality Control Boards

The State Water Resources Control Board (SWRCB) and RWQCBs are the principal state agencies responsible for water quality coordination and control. They jointly establish water quality standards including water quality objectives, beneficial uses, and an anti-degradation policy. They also regulate waste discharges to ensure compliance with water quality standards. These water quality standards are described in detail in their applicable RWQCB basin plans. States designate beneficial uses for all water body segments, then set criteria to protect those uses. Water quality standards developed for particular water segments are therefore based on designated uses, and vary depending on those uses. In addition, each state identifies waters that fail to meet standards for specific pollutants. These waters are then state-listed in accordance with CWA Section 303(d). If a state determines that those waters are indeed impaired, the CWA requires establishment of total maximum daily loads. Total maximum daily loads specify allowable pollutant loads from all sources (point, nonpoint, and natural) for a given watershed.

SWRCB Resolution No. 68-16 (Antidegradation Policy) mandates that the state's high-quality waters be maintained until it can be demonstrated that any change in quality (1) will be consistent with maximum benefit to the people of the state, (2) will not unreasonably affect present and anticipated beneficial uses, and (3) will not result in water quality that violates adopted policies. Any activity that produces or may produce waste, increases the volume or concentration of waste, or discharges or proposes to discharge to existing high quality waters must meet waste discharge requirements (WDRs). WDRs are intended to promote the best practicable treatment or control of the discharge to ensure that pollution or a nuisance will not occur, and to maintain the highest water quality with maximum benefit to the people of California.

SWRCB No. 88-63 (Sources of Drinking Water Policy) requires that all groundwater and surface water of the state be suitable for municipal or domestic water supply, with the exception of waters that state or regional boards certify under specific conditions.

III.6.1.3 Local

The DRECP area encompasses parts of seven counties: Imperial, Inyo, Kern, Los Angeles, Riverside, San Bernardino, and San Diego counties. Counties have primary authority over land use in privately held unincorporated areas. However, the primary authority over federally owned lands lies with BLM, which manages the land.

III.6.2 Groundwater Resources within the DRECP Area

The California Department of Water Resources (DWR) has mapped 113 groundwater basins in the DRECP area (Figure III.6-1) and published their descriptions in Bulletin 118 (DWR 2003); Table III.6-1 lists the names and acreages for each of the basins.[1] The table also summarizes other information from Bulletin 118, the California Statewide Groundwater Elevation Monitoring Program (CASGEM),[2] and various other reports and maps. These summaries include the existing levels of groundwater use, available water-level data, and documented historical groundwater consumption that have affected basin conditions, and the basin's sensitivity to future development. Basins identified in Table III.6-1 as medium or high priority are required to be included in groundwater sustainability plans as required by the Sustainable Groundwater Management Act of 2014.

III.6.2.1 Adjudicated Basins

Chronic declines in groundwater levels and storage can prompt local users to initiate basin adjudication, a legal settlement that quantifies water rights for all groundwater and surface water users in a basin. In adjudicated basins, the perennial groundwater yield is essentially fully allocated to existing users. An energy project could conceivably purchase sufficient yield from other users to operate a project. Such transfers are less likely to generate objections in adjudicated basins because the sum of all allowances is managed within the range of the perennial yield. However, the adjudicated groundwater withdrawals may be revised downward due to reductions in the perennial yield.

One typical outcome of adjudication is the need for additional imported water supplies. Although imports and adjudication are not necessarily linked, in the DRECP area adjudicated groundwater basins are the same as those with State Water Project contractors. These are the upper, middle, and lower Mojave River Valley basins, Antelope Valley (adjudication is in progress), Brite Valley, Cummings Valley, Tehachapi Valley East, Tehachapi Valley West, El Mirage Valley, Warren Valley (partial), and Upper Santa Ana Valley–Cajon Sub-Basin.

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1 CDWR defines a groundwater basin as an aquifer or an aquifer system that is bounded laterally and at depth by features that affect groundwater flow: rocks or sediments of lower permeability, geologic structures (such as a fault), or hydrologic features (such as a stream, lake, ocean, or groundwater divide). Hydrologic basins, or watersheds, often include areas outside the groundwater basins that can contribute water to the basin (such as runoff from the watershed that percolates into the basin). In groundwater basins where many studies have been completed and the basin has been operated for a number of years, the basin boundaries are well defined. Even in these basins, however, there are unknowns and the boundaries may change as more information is collected and evaluated. Many of the CDWR sub-basin boundaries were developed or modified with public input, but little physical data. Because they should not be considered precise boundaries, a detailed local study that defines actual groundwater-flow paths is required to determine whether a specific area lies within a groundwater basin boundary.

2 CASGEM is a statewide program to monitor seasonal and long-term trends in groundwater elevations in California's groundwater basins.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
7-16	Ames Valley	108,000	<0.03 < 3,000	Very Low	No Designation	No	A preliminary water budget indicates that the basin is close to balance under average conditions. The pumping rates during 1990-1996 resulted in an observed rapid decrease in groundwater elevations.
7-34	Amos Valley	130,000	<0.03 < 4,000	Very Low	No Designation	No	Water level declines reported up to 29 ft. during 1979-2000.
6-44	Antelope Valley	1,010,000	0.03-0.20 30,000-200,000	High	Yes	Yes (pending)	Water level declines, storage depletion, and subsidence reported. Extractions likely exceed natural recharge.
7-37	Arroyo Seco Valley	256,000	<0.03 < 8,000	Very Low	No Designation	No	Uncertain.
6-26	Avawatz Valley	28,000	<0.03 < 800	Very Low	No Designation	No	Uncertain.
7-15	Bessemer Valley	39,000	<0.03 < 1,000	Very Low	No Designation	No	Uncertain.
6-25	Bicycle Valley	89,000	<0.03 < 3,000	Very Low	No Designation	No	Long-term hydrographs indicate that groundwater withdrawals have resulted in a water-table decline as much as 70 ft. since late 1960.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
7-24	Borrego Valley	152,000	0.03-0.20 4,000-30,000	Medium	Yes	No	Overdraft of 15,000 acre-feet per year.
7-8	Bristol Valley	497,000	<0.03 < 15,000	Low	No Designation	No	Uncertain.
5-80	Brite Valley	3,000	0.03-0.20 100-600	Very Low	Yes	Yes	Safe Yield is 500 acre-feet annually.
7-32	Broadwell Valley	92,000	<0.03 < 3,000	Very Low	No Designation	No	Uncertain.
6-76	Brown Mountain Valley	22,000	<0.03 < 700	Very Low	No Designation	No	Uncertain.
6-81	Butte Valley	9,000	<0.03 < 300	Very Low	No Designation	No	Uncertain.
7-7	Cadiz Valley	270,000	<0.03 < 8,000	Very Low	No Designation	No	A proposed aquifer storage and recovery project (the Cadiz Valley Water Project) is a significant consideration for groundwater resources.
7-90	Cady Fault Area	8,000	<0.03 < 200	Very Low	No Designation	No	Uncertain.
6-79	California Valley	58,000	<0.03 < 2,000	Very Low	No Designation	No	Uncertain.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
7-41	Calzona Valley	81,000	<0.03 < 2,000	Very Low	No Designation	No	Uncertain.
6-38	Caves Canyon Valley	73,000	<0.03 < 2,000	Very Low	No Designation	No	If large quantities of water were pumped from the basin, water levels would decline and might stop the flow out of the basin.
7-43	Chemehuevi Valley	272,000	<0.03 < 8,000	Very Low	No Designation	No	Uncertain.
7-32	Chocolate Valley	129,000	<0.03 < 4,000	Very Low	No Designation	No	Uncertain.
7-5	Chuckwalla Valley	602,000	<0.03 < 18,000	Low	No Designation	No	Water levels stable in central and eastern basin; water levels decline of 50 ft. starting in 1980 around the Desert Center.
7-21.01	Coachella Valley–Indio	297,000	0.61-0.8 180,000-240,000	Medium	No Designation	No	Uncertain.
7-21.02	Coachella Valley–Mission Creek	48,000	0.21-0.40 10,000-19,000	Medium	Yes	No	Supplemental recharge (artificial recharge) is needed to reduce annual and cumulative overdraft.
7-11	Copper Mountain Valley	30,000	<0.03 < 900	Very Low	No Designation	No	Uncertain.
6-55	Coso Valley	26,000	<0.03 < 800	Very Low	No Designation	No	Uncertain.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
6-37	Coyote Lake Valley	88,000	<0.03 < 3,000	Very Low	No Designation	No	Declining water levels.
7-29	Coyote Wells Valley	146,000	<0.03 < 4, 000	Very Low	Yes	No	Overdraft is characterized by the sustained groundwater level declines in the past 30 years.
6-35	Cronise Valley	126,000	<0.03 < 4,000	Very Low	No Designation	No	Uncertain.
6-50	Cuddeback Valley	95,000	<0.03 < 3,000	Very Low	No Designation	No	Not enough available data to provide groundwater budget estimates.
5-27	Cummings Valley	10,000	0.41-0.60 4,000-6,000	High	Yes	Yes	Safe Yield is 4,090 acre-feet annually.
7-9	Dale Valley	212,000	<0.03 < 6,000	Very Low	No Designation	No	Groundwater extraction seems very high for a basin with documented water quality issues. USGS data shows declining water levels.
7-13.01	Deadman Valley–Deadman Lake	89,000	<0.03 < 3,000	Very Low	No Designation	No	Uncertain.
7-13.02	Deadman Valley–Surprise Spring	29,000	<0.03 < 900	Very Low	No Designation	No	Between 1952 and 1996 water levels stayed constant in the west and declined by 115 ft. in the east.
6-18	Death Valley	920,000	<0.03 < 28,000	Very Low	No Designation	No	Uncertain.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
6-78	Denning Spring Valley	7,000	<0.03 < 200	Very Low	No Designation	No	Uncertain.
7-33	East Salton Sea	195,000	<0.03 < 6,000	Very Low	No Designation	No	Steady WL decline from 1963-2000 (20 to 40 ft. bls).
6-43	El Mirage Valley	76,000	0.03-0.20 <2,000-15,000	Medium	No Designation	Yes	In the past 15 years the water levels have only fluctuated slightly with a slight trend downwards. The amount of groundwater input to the system must be close to the output or possibly less.
7-2	Fenner Valley	452,000	<0.03 <14,000	Very Low	No Designation	No	Water supplies are adequate for present needs. However, large-scale pumping would result in the lowering of the water table and a reduction of the groundwater in storage.
6-46	Fremont Valley	335,000	<0.03 < 10,000	Low	No Designation	No	Groundwater pumping for agriculture in the Fremont Valley Basin resulted in historical groundwater overdraft. Groundwater use has since declined.
6-85	Gold Valley	3,000	<0.03 < 100	Very Low	No Designation	No	Uncertain.
6-48	Goldstone Valley	28,000	<0.03 < 800	Very Low	No Designation	No	Uncertain.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
6-77	Grass Valley	10,000	<0.03 < 300	Very Low	No Designation	No	Uncertain.
6-84	Greenwater Valley	60,000	<0.03 < 2,000	Very Low	No Designation	No	Uncertain.
6-47	Harper Valley	409,000	0.03-0.20 12,000-82,000	Low	No Designation	No	During 1980 water levels rebounded but within the past couple years water levels have declined as much as 100 ft.
6-74	Harrisburg Flats	25,000	<0.03 < 800	Very Low	No Designation	No	Uncertain.
7-53	Hexie Mountain Area	11,000	<0.03 < 300	Very Low	No Designation	No	Uncertain.
7-30	Imperial Valley	958,000	<0.03 <29,000	Very Low	No Designation	No	The decline in the water table in East Mesa began in 1980 and stabilized in the early 1990s.
6-54	Indian Wells Valley	382,000	0.03-0.20 11,000-76,000	Medium	Yes	No	Water quality issues with respect to overdraft and mixing of aquifers.
7-50	Iron Ridge Area	5,000	<0.03 <200	Very Low	No Designation	No	Uncertain.
6-30	Ivanpah Valley	198,000	<0.03 < 6,000	Very Low	No Designation	No	Uncertain.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
7-18.01	Johnson Valley–Soggy Lake	77,000	<0.03 < 2,000	Very Low	No Designation	No	Uncertain.
7-18.02	Johnson Valley–Upper Johnson Valley	35,000	<0.03 < 1,000	Very Low	No Designation	No	Stable water levels and a preliminary water balance for the basin indicate that the basin is in balance with significant subsurface outflows and losses to evaporation at dry lakes.'
7-62	Joshua Tree	27,000	0.03-0.20 800-5,000	Very Low	No Designation	No	Declining water levels since 1973.
6-89	Kane Wash Area	6,000	0.03-0.20 200-1,000	Very Low	No Designation	No	Not enough data to provide an estimate of groundwater budget.
6-69	Kelso Lander Valley	11,000	<0.03 < 300	Very Low	No Designation	No	Uncertain.
6-31	Kelso Valley	255,000	<0.03 8,000	Very Low	No Designation	No	Water levels have declined by 100 ft. since pumping began in early 1950s.
5-25	Kern River Valley	79,000	<0.03 < 2,000	Very Low	No Designation	No	Uncertain.
7-1	Lanfair Valley	156,000	<0.03 < 5,000	Very Low	No Designation	No	Random fluctuations are seen in the groundwater levels over the approximately 1950s-1980s period, i.e., no obvious patterns of decline or rise.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
6-36.02	Langford Valley–Irwin	10,000	<0.03 < 300	Very Low	No Designation	No	From the early 1980s until mid-1990s, increased pumpage caused water levels to decline about 15 ft. Since 1993 water levels have been recovering in response to decreased pumpage and artificial recharge of wastewater.
6-36.01	Langford Valley–Langford Well Lake	19,000	<0.03 < 600	Very Low	No Designation	No	WL contours for 1995, 2000, 2005 and 2010 conditions show that groundwater withdrawals have resulted in a cone of depression in the central part of the basin. WLs have declined by 50 ft.
7-14	Lavic Valley	102,000	<0.03 < 3,000	Very Low	No Designation	No	Uncertain.
6-27	Leach Valley	61,000	<0.03 < 2,000	Very Low	No Designation	No	Uncertain.
7-51	Lost Horse Valley	17,000	0.03-0.20 500-3,000	Very Low	No Designation	No	Uncertain.
6-71	Lost Lake Valley	23,000	<0.03 < 700	Very Low	No Designation	No	Uncertain.
6-21	Lower Kingston Valley	240,000	<0.03 < 7,000	Very Low	No Designation	No	Uncertain.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
6-40	Lower Mojave River Valley	285,000	0.03-0.20 9,000-57,000	Medium	Yes	Yes	The cumulative groundwater production upstream of the city of Barstow led to overdraft of the Mojave River groundwater basin. The water-level change data from 334 wells show that more than one half (102) of the wells in the Mojave River groundwater basin had water-level declines of 0.5 feet or more, and almost one fifth (32) of the wells had declines greater than 5 feet between 2002 and 2004.
7-19	Lucerne Valley	147,000	0.03-0.20 4,000-29,000	Low	Yes	Yes	Since adjudication in 1996, water levels have remained relatively constant and, in fact, have begun to rise in some locations. This rise suggests that modern groundwater recharge must be similar to, or exceed, the volume of groundwater production.
7-17	Means Valley	15,000	<0.03 < 400	Very Low	No Designation	No	Uncertain.
6-29	Mesquite Valley	88,000	0.03-0.20 3,000-18,000	Very Low	No Designation	No	Uncertain.
6-20	Middle Amargosa Valley	390,000	<0.03 < 12,000	Very Low	No Designation	No	Uncertain.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
7-41	Middle Mojave River Valley	211,000	0.03-0.20 6,000-42,000	Low	No Designation	Yes	The cumulative groundwater production upstream of the city of Barstow led to overdraft of the Mojave River groundwater basin. The water-level change data from 334 wells show that more than one half (102) of the wells in the Mojave River groundwater basin had water-level declines of 0.5 feet or more, and almost one fifth (32) of the wells had declines greater than 5 feet between 2002 and 2004.
7-20	Morongo Valley	7,000	<0.03 < 200	Very Low	No Designation	No	Uncertain.
7-44	Needles Valley	88,000	<0.03 < 3,000	Low	No Designation	No	Uncertain.
7-25	Ocotillo–Clark Valley	222,000	<0.03 < 7,000	Low	No Designation	No	The computed decline from 1925 to December 1975 was 15 ft. in Ocotillo. Groundwater levels declined 5 to 8 ft. during the period 1975 to 2001.
7-35	Ogilby Valley	133,000	<0.03 < 4,000	Very Low	No Designation	No	Uncertain.
7-31	Orocopia Valley	96,000	0.41-0.60 39,000-58,000	Very Low	No Designation	No	Uncertain.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
6-12	Owens Valley	661,000	0.03-0.20 20,000-130,000	Medium	No Designation	No	Uncertain.
6-88	Owl Lake Valley	22,000	<0.03 < 700	Very Low	No Designation	No	Uncertain.
6-28	Pahrump Valley	93,000	0.03-0.20 3,000-19,000	Very Low	Yes	No	Groundwater development has caused more than 10 ft. of decline in water levels. Excessive water level decline, subsidence, depletion of aquifer.
7-39	Palo Verde Mesa	225,000	<0.03 < 7,000	Low	No Designation	No	Uncertain.
7-38	Palo Verde Valley	73,000	<0.03 < 2,000	Low	No Designation	No	Uncertain.
6-58	Panamint Valley	259,000	<0.03 < 8,000	Very Low	No Designation	No	Uncertain.
6-51	Pilot Knob Valley	138,000	<0.03 < 4,000	Very Low	No Designation	No	Uncertain.
7-6	Pinto Valley	182,000	<0.03 < 6,000	Very Low	No Designation	No	Uncertain.
7-49	Pipes Canyon Fault Valley	3,000	<0.03 < 100	Very Low	No Designation	No	Uncertain.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
7-45	Piute Valley	175,000	<0.03 < 5,000	Very Low	No Designation	No	Uncertain.
7-52	Pleasant Valley	10,000	<0.03 < 300	Very Low	No Designation	No	Uncertain.
7-40	Quien Sabe Point Valley	25,000	<0.03 < 800	Very Low	No Designation	No	Uncertain.
6-24	Red Pass Valley	96,000	<0.03 < 3,000	Very Low	No Designation	No	Uncertain.
6-86	Rhodes Hill Area	16,000	<0.03 < 500	Very Low	No Designation	No	Uncertain.
7-4	Rice Valley	188,000	<0.03 < 6,000	Very Low	No Designation	No	Uncertain.
6-23	Riggs Valley	88,000	<0.03 < 3,000	Very Low	No Designation	No	Uncertain.
6-56	Rose Valley	42,000	0.03-0.20 1,000-8,000	Very Low	No Designation	No	Long-term groundwater level monitoring data collect beginning in 2001 have shown increased levels by 1 to 2 ft.
6-53	Salt Wells Valley	30,000	<0.03 < 900	Very Low	No Designation	No	Uncertain.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
6-52	Searles Valley	197,000	<0.03 < 6,000	Very Low	No Designation	No	Not enough data to provide an estimate of groundwater budget. WLs declined 110 ft. from 1917-1967.
6-34	Silver Lake Valley	35,000	<0.03 < 1,000	Very Low	No Designation	No	Uncertain.
6-33	Soda Lake Valley	380,000	<0.03 < 11,000	Very Low	No Designation	No	Groundwater discharge occurs through evaporation since the water table is so close to the surface. Extensive pumping would most likely have negative effects.
6-82	Spring Canyon Valley	5,000	<0.03 < 200	Very Low	No Designation	No	Uncertain.
6-49	Superior Valley	120,000	<0.03 < 4,000	Very Low	No Designation	No	Not enough data to provide an estimate of groundwater budget.
7-45	Tehachapi Valley East	24,000	<0.03 < 700	Very Low	Yes	Yes	Safe yield for Tehachapi Valley (east and west combined) is 5,500 acre-feet annually.
5-28	Tehachapi Valley West	15,000	0.21-0.40 3,000-6,000	Medium	Yes	Yes	Safe yield for Tehachapi Valley (east and west combined) is 5,500 acre-feet annually.
7-10	Twenty nine Palms Valley	62,000	0.03-0.20 2,000-12,000	Low	No Designation	No	Uncertain.
6-22	Upper Kingston Valley	177,000	<0.03 < 5,000	Very Low	No Designation	No	Uncertain.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
6-42	Upper Mojave River Valley	412,000	0.21-0.40 87,000-160,000	High	Yes	Yes	The cumulative groundwater production upstream of the city of Barstow led to overdraft of the Mojave River groundwater basin.The water-level change data from 334 wells show that more than one half (102) of the wells in the Mojave River groundwater basin had water-level declines of 0.5 feet or more, and almost one fifth (32) of the wells had declines greater than 5 feet between 2002 and 2004.
8-2.05	Upper Santa Ana Valley–Cajon	23,000	>0.8 > 18,000	Very Low	No Designation	No	Uncertain.
7-28	Vallecito-Carrizo Valley	122,000	<0.03 < 4,000	Very Low	No Designation	No	Uncertain.
7-42	Vidal Valley	138,000	<0.03 < 4,000	Very Low	No Designation	No	Uncertain.
7-3	Ward Valley	558,000	<0.03 < 17,000	Very Low	No Designation	No	Uncertain.
7-12	Warren Valley	24,000	0.03-0.20 700-5,000	Medium	No Designation	Yes	Water levels have increased since 2009.
7-22	West Salton Sea	105,000	<0.03 < 3,000	Very Low	No Designation	No	Uncertain.

Table III.6-1
California Department of Water Resources Basins in the DRECP Area
(See Figure III.6-1 for basin locations.)

CDWR Basin Number	Groundwater Basin Name	Basin Area (acres)	Estimated Groundwater Use (ac-ft/acre ac-ft/yr)	CDWR Basin Priority	Designated Overdraft Conditions	Adjudicated Basin	Water Level and Water Budget Conditions
6-75	Wildrose Canyon	5,000	<0.03 < 200	Very Low	No Designation	No	Uncertain.
6-19	Wingate Valley	71,000	<0.03 < 2,000	Very Low	No Designation	No	Uncertain.
7-36	Yuma Valley	124,000	<0.03 < 4,000	Very Low	No Designation	No	Uncertain.

The following general rounding rules were applied to calculated values: values greater than 1,000 were rounded to the nearest 1,000; values less than 1,000 and greater than 100 were rounded to the nearest 100; values of 100 or less were rounded to the nearest 10, and therefore totals may not sum due to rounding. In cases where subtotals are provided, the subtotals and the totals are individually rounded. The totals are not a sum of the rounded subtotals; therefore the subtotals may not sum to the total within the table.

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III.6.2.2 Sole-Source Aquifers

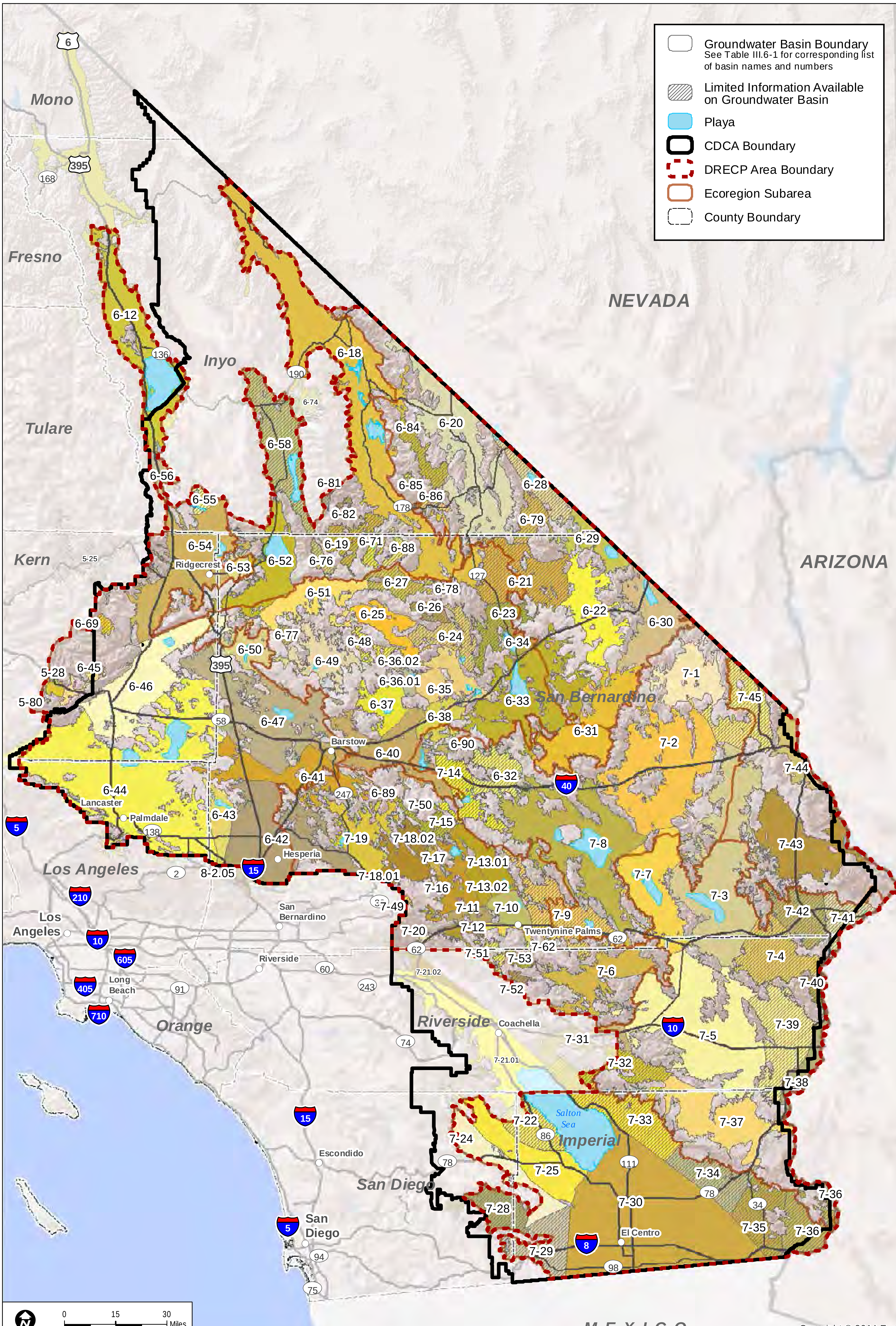
Since 1977, EPA's Sole-Source Aquifer (SSA) Program has been used by communities to prevent contamination of groundwater from federally funded projects; this has had the added benefit of increasing public awareness of groundwater resource vulnerability. The only existing SSA within the DRECP area is the Ocotillo–Coyote Wells Aquifer, which is part of the Ocotillo–Clark Valley shown in Figure III.6-1 (Basin 7-25) and straddles the Imperial–San Diego County line.

III.6.2.3 Basins Tributary to the Colorado River

Colorado River water rights are managed under numerous compacts, federal laws, court decisions and decrees, contracts, agreements, rules, guidelines, and policies collectively known as the "Law of the River." This collection of documents apportions use of Colorado River water and regulates its management among the seven basin states and Mexico. It is administered by USBR (USBR 2010). This body of law was affirmed and clarified in the Consolidated Decree (547 U.S. 150, 2006).

Several groundwater basins along the eastern edge of the DRECP area are hydraulically connected and possibly coupled, or tributary, to flow in the Colorado River. These basins are segregated into three categories (Figure III.6-2): (1) "Floodplain Areas," as mapped for the USBR by the USGS; (2) the larger "River Aquifer," mapped for the USBR by the USGS; and (3) the basins described in CDWR Bulletin 118 with subsurface outflow toward the Colorado River and thus classified as "possibly tributary" to the river. The Colorado River Aquifer includes groundwater beneath the river floodplain. The Colorado River Accounting Surface is defined to represent the elevation and slope of the static water table in the River Aquifer outside the floodplain and the reservoirs of the Colorado River that would exist if the water in the River Aquifer were derived only from the river. The accounting surface extends outward from the edges of the floodplain or a reservoir to the subsurface boundary of the River Aquifer. That aquifer also includes saturated sediments above the accounting surface that are higher in elevation and hydraulically connected below the river channel itself.

The accounting surface delineates the area where groundwater pumping is to be managed, pursuant to USBR's accounting of the disposition of Colorado River water (USBR 2011). Groundwater basins entirely or partially located within the Colorado River Aquifer include: Arroyo Seco Valley, Cadiz Valley, Calzona Valley, Chemehuevi Valley, Chuckwalla Valley, Imperial Valley, Needles Valley, Ogilby Valley, Palo Verde Mesa, Palo Verde Valley, Quien Sabe Point Valley, Rice Valley, and Yuma Valley. Four additional basins that are not located within the River Aquifer, but which CDWR Bulletin 118 indicates are potentially tributary to the aquifer are the Chocolate Valley, Orocopia Valley, Pinto Valley, and Vidal Valley basins.



Sources: ESRI (2014); California Department of Water Resources (2003)

FIGURE III.6-1

Groundwater Basins and Data Availability

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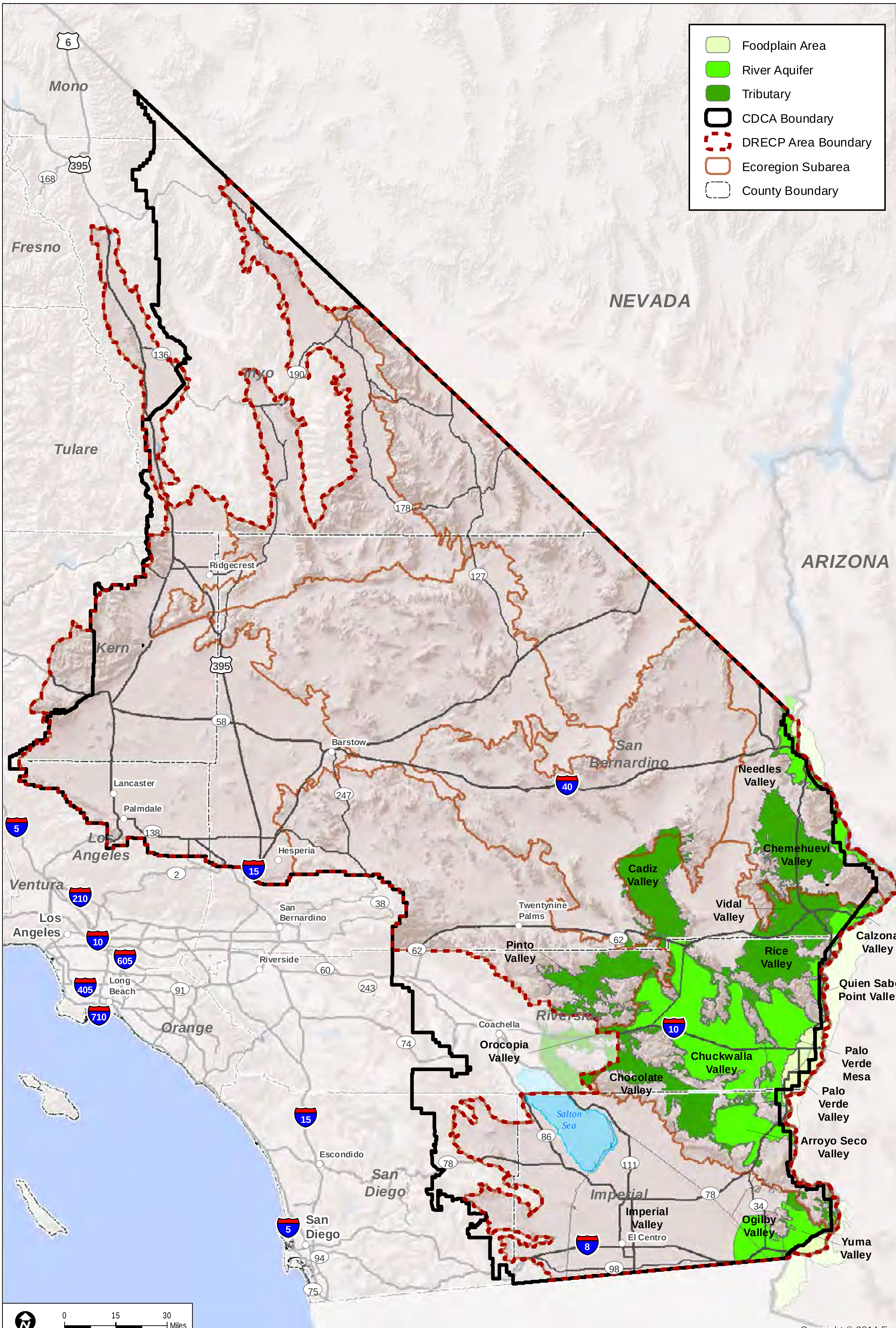

Sources: ESRI (2014); California Department of Water Resources (2003), U.S. Bureau of Reclamation (2011b)

FIGURE III.6-2

Groundwater Basins Coupled or Possibly Tributary to the Colorado River

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Extraction wells located in potentially tributary basins may intercept groundwater recharge that otherwise flows to the Colorado River Aquifer. Water-level data are sparse for these alluvial basins, so the direction or rate of groundwater flow are often uncertain. Given the low rates of groundwater recharge in the eastern part of the DRECP area, subsurface flow from these interior basins into the River Aquifer may represent only a small contribution to the overall volumetric groundwater budget (Wilson and Owen–Joyce 1994). Water level data from monitoring wells are not available, however, and would be needed to calculate these flows and determine their relative significance to the Colorado River Aquifer groundwater budget.

Renewable energy projects that consumptively use groundwater from either the floodplain, or from near, at, or below the accounting surface mapped for the aquifer, would need to acquire water from an existing Colorado River water user. In 2013, 77% of the state's 4.4 million acre-feet/year normal apportionment was used by four entities with senior rights: Palo Verde Irrigation District, Yuma Project (Reservation Division), Imperial Irrigation District, and Coachella Valley Water District. The fourth and fifth priority allocations are owned by the Metropolitan Water District of Southern California (Metropolitan Water District of Southern California 2009).

III.6.3 Hydrogeological and Water Quality Framework

III.6.3.1 Aquifer Characteristics

Aquifers in the Basin and Range Province in the DRECP area are often composed of unconsolidated Quaternary alluvial deposits underlain by older unconsolidated to semi-consolidated Quaternary to Tertiary alluvial deposits. These deposits consist of intermixed gravel, sand, silt, and clay. Less productive aquifers are composed of playa lake deposits, clays, and fine grained materials. The shallow dune sand deposits, and unconfined alluvial channel sands and gravels are often dry.

The more productive aquifers vary in location and area. Certain basins have an extensive aquifer system with Miocene to Quaternary continental deposits of moderately consolidated sand, gravel, and boulders (for example, the Antelope Valley, Copper Mountain Valley, Deadman Valley [Deadman Lake and Surprise Spring], Joshua Tree, and Twentynine Palms Valley basins), or the coarse grained fanglomerate deposits of boulders, lacustrine clay, and interbedded basalt flow formed by the Pinto or Bouse Formation (for example, the Chuckwalla Valley, Death Valley, Needles Valley, Orocopia Valley, and Palo Verde Valley basins). In contrast, near the Mojave and Colorado rivers the most productive aquifers are found in the Pleistocene and younger floodplain deposits adjacent to the rivers.

In addition to alluvial basin aquifers, in some locations the DRECP area is underlain by deeper, regional carbonate aquifers. For example, springs and seeps in the Death Valley area are generally supported by groundwater discharge from the regional carbonate aquifer system that underlays a large portion of Nevada and part of Utah. Another example is the springs and seeps in the San Bernardino Mountains that are fed by groundwater from local carbonate sediments.

Another characteristic of desert aquifers in the DRECP area is that most seeps, springs, and rivers are groundwater dependent. That is, these riparian areas exist due to subsurface structures or other geological conditions, and the groundwater discharge is generally from recharge that is relatively far away. Two examples of this are the Mojave River at Afton Canyon and the designated Wild and Scenic Amargosa River.

Fractured rock can form another type of aquifer. These fractured-rock aquifers generally occur in bedrock units with little to no primary permeability. Limited groundwater may be associated with these permeable fractures and joints. This type of aquifer will generally produce enough water for modest domestic use.

The storage capacities of DRECP area alluvial basins reported in CDWR Bulletin 118 vary widely and are mapped in Figure III.6-3. The groundwater storage capacity is primarily a function of basin area, basin depth, and sediment texture. Sediment texture refers to the relative proportions of clay, silt, sand, and cobles (particle size) and their influence on the porosity and permeability of the sediment deposit. Both groundwater storage and storage capacity estimates are relatively large for most of the basins due to the mapped size and scale of this analysis. Recharge, however, can be relatively small in the same basins because of the arid climate (see Section III.6.3.3.2), and the large storage capacity can create the misleading impression that groundwater availability is high, leading in turn to potentially erroneous long-term commitments or allocations of the resource that ignore perennial groundwater yield constraints.

Recognizing this limitation, the comparison of basin storage capacities is useful only for qualitative comparisons of the relative resource potential between basins. Perennial (or sustainable) yield is a more useful gauge of groundwater availability; that is, water that is produced without damaging the aquifer or negatively affecting groundwater users and groundwater-dependent resources. Exceeding a basin's perennial yield can cause subsidence, increased pumping lifts, and drying of springs, streams, and playas.